The British Columbia Science and Technology Fund

A FRAMEWORK FOR ACTION

Province of British Columbia,
Ministry of Advanced Education,
Training and Technology
Hon. Bruce Strachan, Minister

The British Columbia Science and Technology Fund:

A FRAMEWORK FOR ACTION

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and Technology

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EXECUTIVE SUMMARY

British Columbia's continued ability to compete in the world marketplace depends a great deal on its commitment to science and technology. Industry, government and the educational institutions must innovate. This means industrial research and development and investment in new products and processes. The role of government is to assist industry and educational institutions through leadership, coordination and funding.

This document, A Framework for Action, sets out the principles and processes which will guide the administration of the Province's new Science and Technology Fund - totalling $420 million over the next five years.

The Science and Technology Policy, developed by the Premier's Advisory Council on Science and Technology (PACST) and adopted by Cabinet in 1988, is based on a vision of British Columbia twenty years from now. This vision incorporates goals of assisting in economic diversification, enhancing industrial competitiveness in both new and traditional industries, assisting in the creation of new export industries and emphasizing technologies that promote a clean environment.

The Science and Technology Fund Act, in support of the Policy, provides for funding:

- to support research and development;
- to promote public awareness of science and technology;
- to support infrastructure and human resources for science and technology;
- to encourage the growth of advanced technology; and
- to provide funding for major projects.

This Framework is based on consultations with more than 200 individuals in industry, government, and educational institutions and on the results of a survey conducted by the Science Council of British Columbia.

Principles

All activities undertaken through the Fund will be conducted in accordance with the principles of effectiveness, flexibility, fairness, delegation, consultation, building on existing strengths, complementarity, and market pull. Risk will be accepted as an inherent aspect of the process of discovery.

Fund Operation

Individual initiatives will be assessed by peer review for industrial relevance, scientific excellence and the capacity and ability of the proponents.

Programs will arise from a variety of sources and will be delivered by a variety of agencies.

An annual review of the Fund and its operations, involving the Science Council of British

Columbia and its Strategic Planning for Applied Research and Knowledge (SPARK) committees, ministries, and others, will consider new opportunities and initiatives. PACST will advise the Ministry on overall priorities and directions.

Envelope Allocation

The provisional allocation of funding among five envelopes is as follows:

Envelope	Percentage
Research and Development	27% - 35%
Infrastructure	25% - 32%
Human Resource Development	7% - 10%
Public Awareness	2% - 5%
Special Projects	25% - 30%

Each of these envelopes will contain a number of programs and projects.

Financial Issues

A variety of forms of assistance are possible under the Fund including grants, scholarships, repayable contributions, awards, direct expenditures, or any combination of these. Fund operations will include multi-year financial commitments, and corresponding accounting requirements. Support costs will be distributed among the five envelopes.

Working with the Community

The successful use of the Fund will depend on the Science and Technology Division's partners. Partners in Fund administration will include PACST and the Science Council of British Columbia, while delivery partners will include post-secondary institutions, B.C. Advanced Systems Institute, Science World, Discovery Foundation, Science Council and other provincial and federal ministries.

Working With Governments

The Fund will respect the mandates of other divisions, ministries, or governments. The division will consult fully with interested ministries. Joint initiatives will be undertaken only in support of Fund goals.

Fund Evaluation

The Ministry's evaluation activity will focus on the overall impact of the Fund and on programs.

All new programs will include an evaluation plan and plans will be developed for existing programs. Program evaluations will rely on a variety of measures, rather than a single yardstick.

Communications Plan

The Ministry, the delivering agencies or institutions, and individual project applicants each have an important role. Communication expenses will be eligible costs in most programs.

Chapter 1

INTRODUCTION

British Columbia has one of Canada's most successful provincial economies. Its people enjoy a high standard of living, derived from a competitive, export-driven economy. The resource sector still forms the base of our economy, but most new jobs are being created in the knowledge-based secondary manufacturing and service industries.

Science and technology have been solid contributors to the growth of the provincial economy, and their contribution to the growth of the British Columbia economy must increase if the Province is to succeed in a highly competitive, global-based economy capable of maintaining and enhancing our standard of living.

The Provincial Government has been a strong supporter of science and technology during the last decade by supplying leadership and funding, and by committing the talents of its best people. The development of science and technology has become one of the Government's priorities as a tool for economic development.

On April 19, 1990, the Government announced a major new initiative: the Science and Technology Fund. This Fund, established by the Science and Technology Fund Act, will mean significant long term benefits for the Province, and will further establish British Columbia as a national leader in science and technology.

Through the Fund, the provincial government is committed to invest $420 million, an increase of $300 million, on science and technology activities over the next five years. This investment will be in activities the government considers strategic to the development of the provincial economy. The Fund will consolidate all Ministry of Advanced Education, Training and Technology science and technology programs under one umbrella, and provide funding for new provincial science and technology activities. The annual allocation to the fund will increase to $122.6 million by the fifth year of the Fund compared to $29.3 million in 1989-90.

The Fund's objectives, as laid out in the 1990 Budget, are:

- assisting in diversifying the economy;
- enhancing industrial competitiveness in new technologies and traditional industries;
- helping create new export industries; and
- emphasizing technologies that promote a clean environment and quality of life.

The Act provides that the Fund may be used to:

- provide financial assistance for scientific and technological research and development;

- promote public awareness of science and technology;
- ensure the availability of the trained personnel and facilities that are necessary to provide an infrastructure conducive to the conduct of scientific and technological research;
- provide funding for programs to encourage the growth of advanced technology in British Columbia; and
- provide funding for major projects leading to greater economic diversification in British Columbia and increased industrial competitiveness.

The Fund represents an exciting departure in provincial funding strategies, and recognizes the unique needs of the science and technology community.

The purpose of this document is to establish an operational framework for the Fund. The aim is to ensure that the Fund will serve the objectives by the means laid out in the Act and so support the British Columbia Science and Technology Policy (see Chapter 2).

This Framework is based on consultations with more than 200 individuals from industry, government, and educational institutions. It also takes into account the results of a survey conducted by the Science Council of British Columbia, to which an additional 200 people responded. The input received will contribute to the development of new programs. Under this Framework, programs will be developed over the coming months and years to take advantage of new opportunities and to build on existing strengths.

Chapter 2

RATIONALE

British Columbia's continued ability to compete in the world marketplace depends a great deal on its commitment to science and technology. Industry, government and the educational institutions must innovate. This means industrial research and development and investment in new products and processes. The role of government is to assist industry and educational institutions by providing leadership, coordination and funding.

Two elements critical to the use of science and technology for economic development are a vision and a well defined strategy for achieving that vision. The Province is fortunate that these are clearly laid out in the 20 year Vision for the Province, and the Science and Technology Policy, both presented in the document titled Strategies For Innovation, and repeated below.

This vision and the policy were adopted by Cabinet in 1988 as the basis for building a knowledge based economy in British Columbia. All the activities of the Science and Technology Fund will support the Policy and move us towards the vision.

Vision

The 20 Year Vision sees British Columbia as having:

- A strong global-based economy that provides its people with one of the highest standards of living in the world;
- Extraordinary renewable resources (forests, fish, water, wildlife) that it cultivates with care;
- A population of well-educated, healthy people, productively employed;
- A clean environment;
- A special relationship with Pacific Rim countries that fosters exchange and trade; and
- A reputation for being a receptive host to visitors who wish to share its beauty, its adventure, and its industry.

Policy

1. Support the use and development of technological innovations that build on existing strengths and capabilities that have export potential.
2. Encourage the use of science and technology to optimize the quality of life for British Columbians through protecting and improving our natural, man-made, and cultural environments, and do so in a way that produces products and services that can be exported.

3. Recognize the importance of basic research, and encourage applied research of an international calibre in areas that contribute significantly to British Columbia's economic development and competitiveness.

4. Foster entrepreneurial enterprises and encourage partnerships among post-secondary institutions, government, industry, and labour that will promote technology transfer and encourage commercialization of the results of our basic and applied research.

5. Support the development of marketing programs that take advantage of British Columbia's unique geographical location and cultural makeup.

6. Strengthen the science and technology components at all levels of the educational system so that science and technology, and our universities continue to produce graduates and research of the highest possible calibre.

7. Encourage government, institutions, industry and labour to communicate the benefits of science and technology to the general public so that the public supports science and technology policies and initiatives.

8. Make educational programs available in science and technology to enable retraining, upgrading and acquisition of new knowledge, to ensure an educated and adaptable work force in the trades and professions.

9. Provide a level of direct government financial support for technology-intensive industries that will enable British Columbia to be competitive nationally and internationally.

The Vision and Policy lay out where we should be going and how we should get there. The operational principles and funding allocations set out later in this document, and the objectives established in the Budget, directly reflect the Policy. The Framework also responds to one other key event, the National Forum of Science and Technology Advisory Councils of August, 1989, which called for action on five issues:

1. **Research and Development (R&D) Expenditures**

   Canada spends about 1.3 percent of its GDP on research and development, compared to about 2.5 percent for most successful industrial nations. Canada's performance on this critical indicator has actually been falling. The Forum established a national target of 2.5 percent by the end of the century.

2. **Public Awareness of Science and Technology.**

   The Forum recommended a concerted effort to increase public awareness about the benefits of science and technology and opportunities in future job creation, career development and product innovation.

3. **Human Resource Development**

   A knowledge-based economy requires a secure supply of highly trained creative individuals. The Forum advocated more flexibility and innovation to adapt education to meet the needs of society.

4. **Enhancement of Science-Based Innovation**

   The switch from a resource based economy to one based on knowledge-intensive processes, the Forum said, will require more application and development of advanced technology.

5. **Canadian Ownership**

   The Forum said it is important to identify the factors which support and encourage Canadian ownership in high technology.

These issues largely correspond to the "envelopes" established in Chapter 4 for operation of the Fund. The structure of the Fund itself reflects the unique nature of science and technology enterprises. These enterprises are long term; payoffs in some cases will take many years to materialize. They are often complex, and the timing of funding requirements can be hard to predict. Thus, the Fund incorporates a long-range, five-year commitment, and is set up such that funds unspent in one year carry over to the next. Government's investment will be repaid mainly in terms of economic development. However, the Fund has also been set up to receive revenues, where the Government's investment can result in direct cash returns.

Chapter 3

PRINCIPLES

All activities undertaken through the Science and Technology Fund will be conducted in accordance with the Science and Technology Policy and the following principles:

Effectiveness.

All initiatives will conform to the Science and Technology Policy and the Science and Technology Fund Act. They will exploit regional science and technology opportunities and, where feasible, will lever investment by industry and other levels of government. They will seek out and support excellence.

Flexibility.

The Fund and its initiatives will be flexible and responsive to emerging opportunities. The Fund will permit both short and long term (multi-year) commitments and will employ a variety of financing arrangements. The programs will be discretionary, rather than entitling, and will be designed around strategic goals.

Fairness.

Applications will be reviewed through an impartial process, established in advance, which will include peer review. (For discussion of peer review see Chapter 5.)

Delegation.

Approvals will be made in such a way as to maximize responsibility at the delivery level, in keeping with government policies regarding decentralization of program management. All programs and major projects will be subject to ongoing evaluation by the Ministry based on a comprehensive business plan filed at the outset.

Consultation.

The Ministry will provide leadership in the operation of the Fund in partnership with the science and technology community. This includes wide consultation on the objectives and nature of programs, with heavy reliance on industry, academic peers and others to determine program priorities and project merit.

Build on Existing Strengths.

The Fund will build on our existing strengths in industry sectors and government programs.

Complementarity.

The Fund is designed to complement programs administered by other divisions of the Ministry, by other ministries, by other levels of government and by various agencies. The Fund may only be used to supplement funding from those sources where an initiative significantly advances the goals of the Fund.

Although administered by the Ministry of Advanced Education, Training and Technology, the Fund supports a diverse range of the Government's science, innovation, economic development and diversification goals.

Projects and programs involving responsibilities of other ministries will always include consultations with them.

Risk.

Risk is inherent to the process of discovery. The Fund will be managed to reduce risk, but some projects will not live up to the original expectations. Knowing the rewards of innovation, government recognizes and accepts this risk.

Market Pull.

Activities under the Fund, including long term strategic activities, will be responsive to the market.

Chapter 4

FUNDING ENVELOPES

To effectively determine levels of funding, evaluate progress and to administer the Fund, it is advantageous to divide it into funding envelopes.

This approach provides maximum flexibility to fund activities which cross industrial sectors, fall between sectors, relate to as-not-yet-defined sectors, or involve emerging or mixed technologies. This method avoids competition between sectors for fund allocations and encourages cross fertilization.

The funding Envelopes are **Research and Development**, **Infrastructure**, **Human Resource Development**, **Public Awareness** and **Special Projects**.

Each envelope will provide for a number of programs and initiatives, including those currently operated by the Science and Technology Division. Consultations done in developing this plan identified a large number of program opportunities that will be explored.

Allocation of the Fund to Envelopes

The allocations below are based on known commitments to existing programs, commitments to significant projects in advanced stages of development, and the recommendations of the science and technology community.

Two of the envelopes, Public Awareness and Human Resource Development, are amenable to detailed program planning within well-defined budgets. The allocations for the other three envelopes must be regarded as more tentative, as there is a need to respond to investment opportunities as they arise.

The allocations will be reviewed annually, based on input from the Annual Review (see Chapter 5). The Review will also consider changes in commitments or costs, program experience, and government policies in areas such as education and the environment.

The Science and Technology Policy establishes broad direction for science and technology activities including: building on existing strengths, development of export potential and the protection of the environment. The Premier's Advisory Council on Science and Technology (PACST), the Science Council of British Columbia, the Ministry of Advanced Education, Training and Technology, and the science and technology community are all expected to play a part in refining these priorities, which will influence future allocations.

Research and Development Envelope

Activities in this envelope will stimulate and encourage scientific research and technology development, focussed on innovation and the application of new technologies, products or processes.

These funds will be used wherever possible to lever money from other sources such as industry and other governments, to magnify the impact and help ensure that the investment is market driven.

Estimated allocation: 27% to 35% of the Fund.

Infrastructure Envelope

This envelope will provide physical and institutional infrastructure support to the Science and Technology Policy.

Partnerships with industry and other levels of government will be emphasized.

Estimated allocation: 25% to 32% of the Fund.

Human Resource Development Envelope

Activities in this envelope will help ensure an adequate supply of trained and creative individuals to meet the needs of a knowledge-based economy.

The Fund will be used to provide leadership to increase the quality and quantity of science and technology training in British Columbia at all levels from secondary school through technical institutes, undergraduate, graduate and postgraduate education and in the workplace. Government and industry spend many billions of dollars each year in British Columbia on education and training. The Fund will not be used to supplement these education and training expenditures, but to support specific actions that enhance the use and application of these expenditures to meet science and technology needs.

Estimated allocation: 7% to 10% of the Fund.

Public Awareness Envelope

Activities in this envelope will promote the development and growth of a science and technology culture in British Columbia.

Funding in this envelope will support public awareness programs and encourage use of community based resources to increase public awareness about science and technology.

Estimated allocation: 2% to 5% of the Fund.

Special Projects Envelope

The Special Projects envelope will allow the Fund to take advantage of the unique opportunities that arise in science and technology. These projects are usually long term and require extensive resources, and may cross several envelopes. The KAON project is an example.

Estimated allocation: 25% to 30% of the Fund.

Chapter 5

OPERATION OF THE FUND

In general, the Fund will be operated in accordance with the principles in Chapter 3, and with the Science and Technology Policy. This chapter describes the specific mechanisms which will be used for program and project approval, annual review of progress and operation of the envelopes.

Operation of Envelopes - General

The programs are of two basic types, client-driven and strategic. In client-driven programs, projects are triggered by an application, usually in a set format, that must meet fairly narrow program criteria. An example is Scientists in the Schools (clients are individual schools wishing to be visited). Strategic programs allow the Ministry to undertake specific projects in support of the objectives of the envelope; this would include feasibility studies and pilot projects. An example is the Science and Technology Action Plan, which supports technology adoption by government ministries.

Programs currently being funded will continue but, as a result of annual reviews, may be adjusted or replaced over time. No changes to these programs are planned in the 1990-91 fiscal year.

New projects or programs will be added as they are developed. Work will continue on those under development at the time of announcement of the Fund.

Most programs will be developed by the Ministry, in consultation with the science and technology community. In addition, programs may be proposed by other parties. Some opportunities will arise from the ongoing work of the SPARK committees (all SPARK sector committees are currently updating their strategic recommendations), the Science Council or PACST. Others may come directly from industry, various science and technology foundations or agencies, educational institutions or other ministries. The consultations underlying this Framework also identified a number of possibilities.

The proponent of a major program or major special project will submit a plan outlining the objectives, the expected outputs and deliverables, as well as the benefits, costs and expected sources of funding over the life of the initiative.

Delivery agencies for ongoing programs will provide such plans on an annual basis, collect data for program evaluation (see chapter 9) and submit an annual report on program performance vis-a-vis the plan.

All the envelopes will include funds for needs definition studies, feasibility studies, program development and evaluation.

Peer Review

The purpose of peer review is to obtain an arm's length, objective evaluation of a project or program by people who are recognized experts in the field. Peer review ensures that each project and initiative funded meets three criteria - excellence in quality, market relevance, and capable proponent.

Because the subject matter and scope of the programs and projects will vary greatly, and because each panel must contain relevant expertise, flexibility in appointing the panels is required.

PACST has agreed to review the use of peer review for the Science and Technology Fund and will make recommendations in September 1990. Pending these recommendations, the process for review of programs will be as follows:

- SPARK will be asked to coordinate the overall peer review process.
- Review of projects under a client-driven program will be arranged, as in the past, by the delivery agency.
- Where feasible, peer review panels will use an existing body, such as a SPARK sector committee, one of the Science Council of British Columbia review committees, or a review committee from another agency.
- Due regard will be taken of each proponent's need for confidentiality. In certain cases, this may mean the Ministry will seek reviewers outside the SPARK framework, but the Ministry will in every case seek SPARK's advice on the choice of reviewers. The proponents of special projects will be consulted on panel membership.

Proposal Process

The application process for client-driven programs will be managed by the delivery agency.

Proposals for special projects, for projects to be funded under strategic programs, or for new programs, will be handled as follows:

The Science and Technology Division will screen the proposal and, if it appears to fit the criteria of an existing client-driven program, will refer it to the delivery agent for the program. Otherwise, if the proposal appears to have merit (and there is available funding) the Division will refer it to SPARK for peer review or, if the proponent demonstrates concerns about confidentiality, to other external reviewers.

Funding Decisions

Funding decisions on programs (either client-driven or strategic) will be made by the Ministry of Advanced Education, Training and Technology following peer review, and will be consistent with overall priorities and direction set from time to time by government and by PACST (including the comprehensive Annual Review described in the next section). In addition, certain major initiatives may be referred to PACST for specific advice.

Decisions on projects under a client driven program will be made by the delivery agency.

Decisions on projects under strategic programs will be made by the Ministry.

No proposal rejected by peer review will be considered for funding. Strategic program projects may be subject to additional consultations before receiving Ministry approval.

Notwithstanding the above, any program or project exceeding $400,000 total cost will require approval by Treasury Board.

Annual Review

An annual review of the Science and Technology Fund will examine the allocation of funds to each envelope and review performance and continued appropriateness of programs and initiatives. The review will take into account new opportunities, major external events such as changes in regulations and government policies, trade rulings or agreements, economic conditions and other factors. It will involve input from the science and technology community through the SPARK committees. It will also incorporate input from the ministries; advanced education institutions; and other institutions, foundations and agencies involved in science and technology.

The review will include an annual conference on programs, projects and results, possibly to be held during Science and Technology Week.

The results of the annual review will be compiled by the Ministry and incorporated into a workplan which will be submitted to PACST for advice before adoption by the Minister.

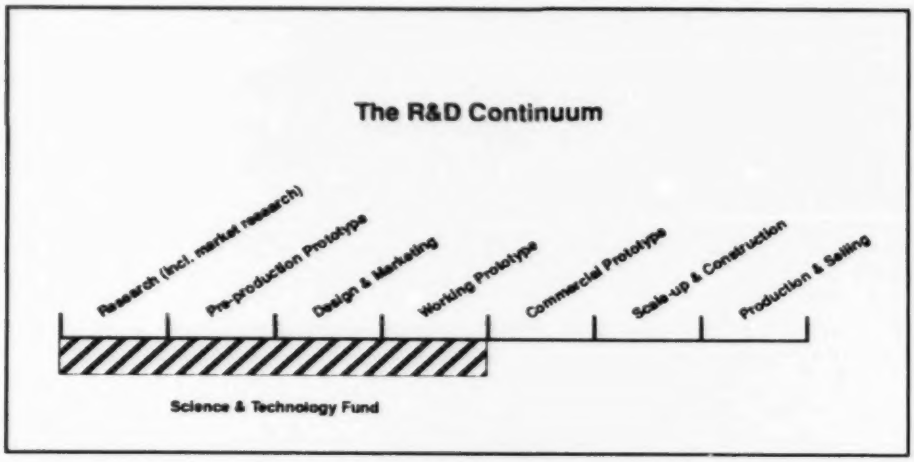
Following are specifics for each envelope:

Operation of Research and Development Envelope

1. Objective and Scope

   The objective of the research and development envelope is to stimulate and encourage scientific research and technology development. It will particularly encourage innovation and the application of new technologies, products or processes. Attention must be paid to ensuring the transfer of developed technologies to the industrial sector for commercial use.

   Research and development activities to be assisted may fall on the development continuum from research through to working prototype, and may include pre-production marketing assistance. Eligible research activities include market research to determine need for a product, service or process and design or other criteria to be considered in the R&D phase. Activities related to commercial prototype, scale-up and construction, and production and selling fall under the mandate of the Ministries of Regional and Economic Development, and International Business and Immigration.



2. Form and Level of Funding

   The Act permits assistance in the form of grants or contributions. It allows flexibility including opportunities for repayment through various mechanisms such as royalties.

   Research assistance will be of two types:

   - **Industry Based** research and development focussing on product and process development and technology transfer. The average level of government support will be 50 percent of eligible costs.

   - **Strategic** research undertaken by post-secondary institutions, industry or not-for-profit foundations or societies, with emphasis on partnerships and supporting strategic objectives endorsed by PACST. Level of government support may be up to 100 percent of eligible costs.

3. Approval of Individual Projects

   Projects will be subject to peer review involving experts from industry, government and academia as described in the section on peer review.

4. Examples of existing programs within the envelope

   - Science and Technology Development Fund/Assistance Grants for Applied Research

   - Technology Assistance Program

Operation of Infrastructure Envelope

1. Objective and Scope

   The objective of this envelope is to provide physical and institutional infrastructure to support the Science and Technology Policy. Infrastructure here means that

combination of organizations, networks and alliances, people, activities and facilities that combine to provide a core around which science and technology development can take place.

It may include support for technology transfer, organizations, studies, facilities and equipment.

2. Form and Level of Funding

Grants will be the most common form for support for infrastructure organizations. Repayable contributions, or grants, possibly tied to a percentage of royalty or licence revenues, are likely forms of assistance for the construction of common facilities. Seed capital assistance may take the form of equity or repayable contributions.

The percentage contribution level will be variable.

3. Approval of Individual Projects

Major initiatives will be cooperatively developed by all parties concerned and may be referred to PACST for advice. Programs and projects will be subject to peer review. Recommended proposals will then be forwarded to the Minister for approval, and, if necessary, Treasury Board.

4. Examples of existing programs within the envelope:

- Premier's Advisory Council on Science and Technology (PACST)
- Science Council of British Columbia (SCBC)
- Discovery Foundation - service centres (DISCOVERY)
- Networks of Centres of Excellence (NCE)
- University - Industry Liaison Offices (UILO)
- Advanced Systems Institute (ASI)

Agency Funding from the Science and Technology Fund (1990/91)

Agency	S&T Fund Contribution ($ millions)	Percentage of Agency Budget from S&T Fund
PACST	0.350	100%
SCBC	4.900	97%
Discovery	0.906	83%
NCE	5.103	32%
UILO	0.740	42%
ASI	2.250	62%

Operation of Human Resource Development Envelope

1. Objective and Scope

   The objective of the Human Resource Development envelope is to ensure the availability of an adequate supply of trained and creative personnel to support a knowledge-based economy.

   The envelope will include incentives for upgrading of the existing workforce and to develop, train and recruit world class scientists, engineers, technicians and technologists. Incentives to provide marketing and management training for scientist entrepreneurs will also be included.

2. Form and Level of Funding

   Assistance may include scholarships, assistance with costs, and awards or prizes.

3. Approval of Individual Projects

   This envelope will likely consist of separate programs, each of which will address a particular aspect of human resource development, such as scholarships, fellowships, employee training incentives, science entrepreneur training incentives and so on. Peer review is a part of the decision process for fellowships and awards.

4. Examples of existing initiatives and programs within the envelope:

   - Scientists in the Schools
   - Science Fairs
   - Science Council Scholarships and Fellowships

Operation of Public Awareness Envelope

1. Objectives and Scope

   The objective of this envelope is to promote the development and growth of a science and technology culture in British Columbia, including an understanding of the relevance of science and technology in our daily lives, its importance in building a globally competitive economy, and the positive values of understanding, curiosity and discovery in their own right.

   Activities will be community-based and province-wide.

2. Form and Level of Funding

   Direct Ministry expenditures are expected as well as grants to agencies or individuals. Repayment to the fund will not normally be expected.

   The percentage contribution will be variable.

3. Approval of Individual Projects

   The Committee on Public Participation in Science and Technology, which represents agencies interested in science and technology awareness, will recommend projects for Ministry approval.

4. Examples of existing programs within the envelope:

   - Science and Technology Week
   - B.C. Discovery Magazine
   - Science World initiatives
   - Support for science shows and displays.

Operation of Special Projects Envelope

1. Objective and Scope

   This envelope will allow the Province to take advantage of unique opportunities in science and technology.

   This envelope supports initiatives that contribute to the objectives of several envelopes. These will be major projects of significant complexity and scope and require a significant amount of dedicated effort.

   Activities are limited only by the Act and the Science and Technology Policy.

2. Form and Level of Funding

   The percentage contribution will be variable.

3. Approval of Individual Projects

   Given the complex nature of these projects, their development will be a cooperative effort. Peer and/or industry review of the scientific, technical, economic, and other issues will take place throughout the development phase. The finalized proposals will be reviewed by PACST and forwarded to the Minister and, if required, Treasury Board.

4. Examples of existing programs within the envelope

   - TRIUMF-KAON
   - Herzberg Astrophysical Institute relocation

Chapter 6

FINANCIAL AND ADMINISTRATION ISSUES

The financial administration of the Fund will conform to the Financial Administration Act and to provincial financial administration operating policies.

Administration

Program support costs, including the cost of administering the Fund, program development and program evaluation, will be distributed among the program envelopes.

Multi-Year Commitments

Operations of the Fund will include the making of multi-year financial commitments and accompanying contractual arrangements subject, as always, to funding being made available in each year through appropriation by the legislature.

Commitments in a fiscal year to a multi-year program or project may be adjusted from time to time as the program or project progresses or as a result of the annual review.

Multi-year accounting procedures will be defined consistent with government policies.

Forms of Assistance

Forms of assistance differ from envelope to envelope. They are described in Chapter 5.

Revenues / Recoveries

There is provision for the Fund to receive revenues and recoveries. Whenever these occur, they will be credited to the Fund and allocated to envelopes during the annual review.

The Ministry will develop a policy on repayments in consultation with Treasury Board Staff, the SPARK Fiscal Committee and PACST.

Payments from the Fund

All payments from the Fund will be linked to performance. Start-up advances are permitted but subsequent payments will be based on performance.

Specific performance milestones will be set out in an agreement between the project proponent and the Province or the delivery agency.

Normally, payments will be made in installments at times consistent with performance milestones and upon receipt of evidence that the preceding installment has been properly expended or committed.

Assistance may only be expended on eligible costs.

Accountability

It is necessary to ensure that all moneys expended under the Fund are applied only to approved costs and in a responsible manner in accordance with the Financial Administration Act and the policies of the provincial government.

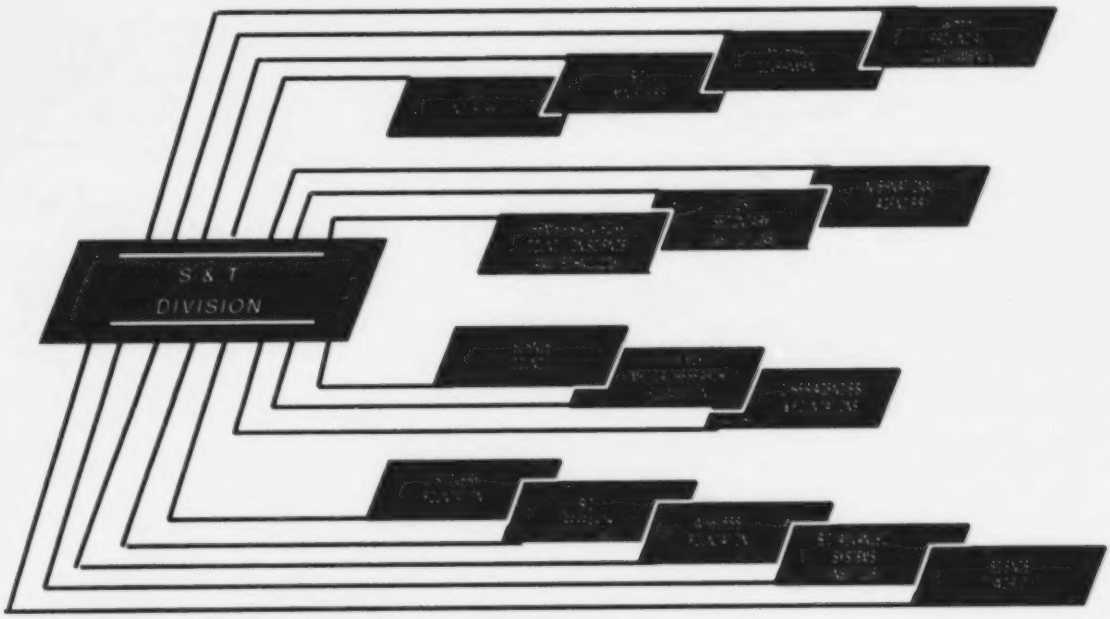
Audited statements showing the use and disposition of assistance will be required in the case of large projects. Other arrangements, such as unaudited statements, submission of invoices and receipts to substantiate expenditures, with the Ministry conducting random audits, will be made in the case of smaller projects.

When assistance is delivered by an agency on behalf of the Province, the agency will ensure that project expenditures are properly accounted for. The Ministry will assist the agency to develop approved mechanisms for each program. The delivering agency will provide audited statements of their expenditures on the program to the Ministry.

Chapter 7

Working with the Community

The successful use of the Science and Technology Fund to develop and enhance the economy of the Province depends on the people who work with the Fund. While the lead role in administration of the Fund will be taken by the Science and Technology Division, the success of the Fund will depend upon the Division's partners in the science and technology community.



Role of the Partners in Fund Administration

1. Premier's Advisory Council on Science and Technology

   PACST advises the Premier and government on science and technology policy.

   PACST's role in the Science and Technology Fund is to act as a Board of Directors, giving the Fund direction, and advising the government on such things as envelope allocation, major initiatives and directions, and amendments required as a result of the Annual Review.

2. Science Council of British Columbia

The Science Council of British Columbia's mandate is to advise government on the implementation of science policy; provide support for applied science; administer the awarding of fellowships, bursaries, and grants to encourage development of improved technology; and gather and organize research material. The Science Council will play a significant role in the annual review, and will deliver some of the new initiatives developed through the Fund.

One of the activities of the Science Council is SPARK (Strategic Planning for Applied Research and Knowledge). SPARK is expected to coordinate the peer review process of the Fund.

3. Committee on Public Participation in Science and Technology

This committee, composed of representatives of the science and technology community involved in science awareness, will act in a consultative and advisory capacity to the Ministry on science and technology awareness. It will also review and recommend programs and projects under the Public Awareness envelope.

Role of the Partners as Delivering Agencies

1. Post-Secondary Institutions

The Universities, Colleges and Technical Institutes will continue their role in technology development and transfer and have input into the annual review process.

2. British Columbia Advanced Systems Institute

The British Columbia Advanced Systems Institute supports research in advanced systems disciplines (artificial intelligence, robotics, computer science, telecommunications and microelectronics) through collaborative efforts among British Columbia's universities and industries. The Institute will continue to deliver support in the advanced systems area, and contribute to the annual review of the Fund.

3. Science World and other Science Awareness Institutions

Science World is mandated to increase the awareness of science in all its aspects among the people of British Columbia. Other Science awareness institutions, such as the Royal British Columbia Museum, Vancouver Public Aquarium and the H. R. MacMillan Planetarium, have more focussed science awareness goals. These institutions have representatives who sit on the Committee on Public Participation in Science and Technology and will continue the delivery of science and technology awareness programs. They will also contribute to the annual review.

4. Discovery Foundation

The Discovery Foundation is mandated to foster and stimulate the development of scientific and technological industries in the Province. Its venture capital subsidiary, Discovery Enterprises Inc., provides pre-venture capital to enterprises in the early stages of their development. Discovery Foundation will continue to deliver programs and provide input into the annual review.

5. Other foundations, institutions and agencies

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It is expected that other foundations, institutions, and agencies may develop roles as delivering agencies for science and technology programs.

CHAPTER 8

WORKING WITH GOVERNMENT

Accomplishing the goals of the Fund will require cooperation with other divisions of the Ministry, other ministries and other levels of government. (See Chapter 3, principle of complementarity).

Science and technology are important to resource ministries, and the Ministries of Health, Transportation and Highways, and Environment, because of the impact of technological innovation, and the large numbers of scientists and engineers the ministries employ. Other ministries, such as the Ministry of Regional and Economic Development, Government Management Services, the Ministry of International Business and Immigration and the Ministry of Education are interested mainly because of the impact on their clients.

The Fund may be used to complement existing initiatives being carried out by other ministries or governments, or for new joint initiatives that will significantly advance the goals of the Fund.

Examples of joint initiatives under development include:

- Research into hydrogen as an alternative fuel, which is being undertaken by the Ministries of Energy, Mines and Petroleum Resources, and Advanced Education, Training and Technology.

- The National Wireless Communication Research Foundation, which involves Industry, Science and Technology Canada, Western Diversification, National Research Council, the federal Department of Communications, and the provincial Ministries of Regional and Economic Development and Advanced Education, Training and Technology.

The Fund will respect the mandates of other divisions of the Ministry, other ministries and other governments. Initiatives under the Fund are expected to complement and enhance initiatives elsewhere in government, not replace them. Examples: additional scholarships for science and technological career paths should enhance the quality of students enrolled in science and technology programs and encourage students to take more science and mathematics courses. On the other hand, support for basic research will remain the domain of the federal granting councils.

The Division will consult fully with ministries whose mandates are touched by Fund operations.

In many joint projects, the best allocation of resources will mean that bodies other than the Ministry of Advanced Education, Training and Technology's Science and Technology Division will provide the bulk of the expertise and/or funding.

To formally initiate a program or special project, a ministry or federal department would submit a written proposal as described in Chapter 5.

The Division will screen the proposal to ensure that it meets the intent of the Fund and the Science and Technology Policy and that funding is available. It will then arrange for peer review.

In addition to peer review, the Ministry decision to participate in a joint program or project will weigh a number of factors including ability to advance the goals of the Fund, strategies of the Division, time frame and overall cost relative to competing projects.

Once a decision to proceed has been made, a steering committee, consisting of at least one member of each ministry or government, will be established to direct the program or project. In the case of major initiatives, the steering committee may see fit to establish one or more subcommittees to deal with specific aspects.

Inter-governmental Agreements

Joint initiatives between the government of British Columbia and federal or other provincial governments will be undertaken within terms and conditions negotiated on an individual project or program basis.

Intra-governmental Agreements

Joint initiatives within the provincial government will be undertaken through a protocol agreement (or letter of agreement) between the ministries involved.

The terms of the agreement will meet the needs of each case, and will depend on factors such as:

- the objective of the proposed program or project and the relative roles of the ministries;
- history of the proposal;
- sources of funding; and
- the expertise and the capacity of the participating ministries or departments to provide supportive programs independent of the Science and Technology Fund.

Protocols will cover issues such as:

- project or program design, including application procedures and related administration;
- receipt and initial screening of applications;
- due diligence (assessment and analysis);
- negotiations and funding decisions;

- project and/or program administration;
- contract administration;
- evaluation;
- revenue generation; and
- payment procedures.

Each protocol will ensure all of the partners will have an opportunity to provide input into the annual review.

Chapter 9

FUND EVALUATION

What Will Be Evaluated?

The Fund is divided into envelopes (Research and Development, Infrastructure, Human Resource Development, Public Awareness and Special Projects). Each envelope contains a number of programs which may be one of two types; client-driven programs, and strategic programs (see Chapter 5). Each program will support a number of projects. In addition there will be unique special projects not associated with a program.

The evaluation targets are:

1. The Fund, to assess its overall impact.
2. Programs and unique projects.

Why Evaluate?

Overall Fund evaluation will be done to determine how well the Fund is meeting the objectives set out in the 1990 Budget:

- To assist in diversifying the economy;
- To enhance industrial competitiveness in new technologies and traditional industries;
- To help create new export industries; and
- To emphasize technologies that promote a clean environment and quality of life.

Program and project evaluation will be done to:

- Assess effectiveness and efficiency;
- Determine if programs need to be adjusted or redirected; and
- Help in the design and implementation of new programs.

The Client

Overall evaluation of the Fund is essential for Treasury Board, which determines the appropriations to support Fund activities, to determine if the Fund is supporting the objectives established for it.

The primary user of program and project evaluations is the Ministry, represented by the Director, Policy and Planning, Science and Technology Division, to assist in program design and administration.

Other users may include central agencies of government, delivery agencies for Fund programs and the Legislature. The science and technology community, which will contribute heavily to program design, will also want and need evaluation information.

The Evaluators

Program evaluation is the responsibility of the Science and Technology Division. Evaluation projects will be done in consultation with the Ministry's Policy, Planning and Program Evaluation Division.

The actual work may be performed by Division staff, by appropriate contractors of the Science and Technology Division, by staff or contractors of the Policy, Planning and Program Evaluation Division, or by staff or contractors of delivery agencies. However, no evaluation will rely exclusively on work done by the agency delivering the program.

How Evaluations Will be Done

Programs and projects will be measured against their own objectives and against the objectives set for the program envelope and the Fund.

Client-driven programs will be designed so that much of the data required for evaluation will be collected routinely. This includes outputs such as the nature and quantity of research and development performed, value of products sold, value and number of patents, jobs created, persons trained, measures of public opinion, and so forth. (These data will also enable ongoing monitoring of programs and accountability of program managers). Other data will be collected to support targeted evaluations.

Evaluations will be designed around "causative models." A causative model lays out in a formal way what a program is supposed to achieve and which program elements are supposed to achieve what. The evaluation asks questions that test whether this program machinery is performing as expected.

The methods used will be tailored to each program or special project. These will include surveys of clients and management, statistical analysis and case studies. There is rarely a perfect measure and, typically, more than one method will be applied. The evaluation will weigh the evidence as a whole -- the notion of "multiple lines of evidence." The lines of evidence to be employed will be specified at the outset, although others may be added when the evaluation is undertaken.

Overall evaluation of the Fund will be based in part upon a rollup of available program and project evaluations. In addition, an analysis will be made of statistical data and other evidence relating directly to the 1990 Budget objectives of diversification, competitiveness, exports and a clean environment.

Evaluation Planning

In the first 18 months:

- ❖ Two evaluations will be completed:
  - "Scientists in the Schools" to determine its impact on student attitudes, and to identify opportunities to improve the program.
  - Assistance Grants for Applied Research (AGAR) to assess the impact of funds used
- ❖ Clear objectives and rationales for existing programs will be established. These objectives and rationales will be reviewed, to address the following questions:
  - Is the program still relevant?
  - Are enough (or too many) resources being used to reasonably meet the objectives?
  - Is the government's role in the program justified?
- ❖ Information systems will be put in place to monitor variables needed to evaluate existing programs
- ❖ Program evaluation plans will be created for all new programs
- ❖ The first annual review and conference (Chapter 5) will be held

In the early years of a program or project, the evaluation will focus on the program rationale, objectives and resource allocation. In the mid-term, evaluation will focus on opportunities for improving or re-directing a program. The longer term will offer more opportunities for assessing program impact and determining how well a program met the original objectives.

Program evaluation will be scheduled strategically rather than on a rigid rotation. It is expected that most programs will be evaluated at least once every three years.

Utilization

Program and special project evaluations will be used mainly to assist the Science and Technology Division to plan and administer programs, and in broad strategic planning. Summaries of evaluation studies may be published in the Ministry's Annual Report.

All evaluations will be reviewed by the Ministry's Executive Committee and then forwarded to PACST. They will be available on request to Treasury Board Staff, the Office of the Comptroller General, and the Office of the Auditor General. PACST will be asked to comment annually on the effectiveness of Fund programs.

In addition, program evaluation results will be used to support the Annual Review (Chapter 5.) The results of the Annual Review, and the annual overall Fund evaluation, will be reported to Treasury Board.

Chapter 10

COMMUNICATIONS

Information on programs and projects will arise from three principal sources:

- the Ministry;
- the agency or institution delivering the program; and
- the individual project applicant.

This Chapter describes the nature and purpose of communications activities expected to arise from these sources and the interactions among them.

The Ministry

The Ministry will undertake activities to: support the initial announcement and promotion of new initiatives and programs; announcement of awards under major competitions, general information regarding the Fund and its various activities; and follow-up public relations and information activities on the success of the Fund. These activities will have a community or regional focus where feasible.

Some examples are:

- press releases and media events for new initiatives and programs, for major awards, and other events;
- a visual identity program;
- literature and promotional materials regarding overall activities;
- an annual conference to highlight project activities and achievements, to be held in conjunction with the annual review;
- a media relations strategy; and
- a comprehensive mailing list of targeted groups.

The Delivering Agencies or Institutions

An agency or institution delivering a program under the Fund, such as the Science Council delivering the STDF-AGAR, is expected to do all necessary information and promotional activities to ensure prospective project applicants or participants are aware of the program, its criteria and guidelines, application procedures and time frame.

Examples are:

- application forms;
- information brochures;
- advertisements;
- articles in trade magazines and professional newsletters;
- professional conferences;
- "success story" articles designed to stimulate interest among would be applicants; and
- workshops and presentations for interested groups.

The delivering agencies will give the Ministry an annual communications plan for the programs they deliver, outlining proposed activities, reasons for undertaking them and estimated costs. The communications plan must be approved by the Ministry. Critical items, such as brochures, may also require specific Ministry approval.

All promotional or informational items will credit the Ministry as source of funds.

The Individual Project Applicants

Applicants may be required to undertake communications activities. Each applicant will outline a brief plan for communication activities at the time of application. However, sales promotion activities will not be eligible costs.

Examples are:

- reporting of results and findings in the scientific literature;
- press releases and articles in the trade press of the resultant technologies and/or findings;
- openings or "unveiling" demonstration ceremonies;
- tours and demonstrations; and
- presentations to interested groups.

In all such activities, credit will be given to the Ministry as source of funding.